Complete nucleotide sequence of the genomic ovine beta-lactoglobulin gene

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S.Harris, S.Ali, S.Anderson, A.L.Archibald and A.J.Clark

AFRC Institute of Animal Physiology and Genetics Research, Edinburgh Research Station, King's Buildings, West Mains Road, Edinburgh, EH9 3JQ, UK
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ß-lactoglobulin (BLG) is the major whey protein found in the milk of a number of species (1,2). The genomic organisation of the ovine BLG gene and its relationship to a number of other secretory proteins has recently been described (3); as has the ability of sequences derived from genomic clone SS1 to direct the synthesis of large quantities of BLG protein into the milk of lactating transgenic mice (4). We present here the 7379 bps of genomic DNA sequence of clone SS1 which are sufficient to direct the tissue-specific expression of this gene in transgenic mice (5).

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   1 gtgctcagcaacacacccagcaccagcattcccgctgctcctgaggtctgcaggcagctcgctgtagcctgagcggtgtggaggg
  86 aagtgtcctgggagatttaaaatgtgagaggcgggaggtgggaggttgggccctgtgggcctgcccatcccacgtgcctgcatta
 171 gccccagtgctgctcagccgtgcccccgccgcaggggtcaggtcactttcccgtcctggggttattatgactcttgtcattgcca
 256 ttgccatttttgctaccctaactgggcagcaggtgcttgcagagccctcgataccgaccaggtcctccctcggagctcgacctga
 341 accccatgtcacccttgccccagcctgcagagggtgggtgactgcagagatcccttcacccaaggccacggtcacatggtttgga
 426 ggagctggtgcccaaggcagaggccaccctccaggacacacctgtccccagtgctggctctgacctgtccttgtctaagaggctg
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 681 cggggcctgaggatgagccaagtgggattccgggaaccgcgtggctgggggcccagccccgggctggctggcctgcatgcgcctcc
 766 tgtataaggccccaagcctgcctgtctcagccctccACTCCCTGCAGAGCTCAGAAGCACGACCCCAGCTGCAGCCATGAAGTGC
 851 CTCCTGCTTGCCCTGGGCCTGGCCCTCGCCTGTGGCGTCCAGGCCATCATCGTCACCCAGACCATGAAAGGCCTGGACATCCAGA
 936 AGgttcgagggttggccgggtgggtgagttgcagggcgggcaggggagctgggcctcagagagccaagagaggctgtgacgttgg
1021 gttcccatcagtcagctagggccacctgacaaatccccgctggggcagcttcaaccaggcgttcactgtcttgcattctggaggc
1106 tggaagcccaagatccaggtgttggcagggctggcttctcctgcggccgctctctggggagcagacggccgtcttctccagtcct
1191 ctgcgcgccctgatttcctcttcctgtgaggccaccaggcctgctggaaacacgcctgcctgcgcagcttcacacgacctttgtc
1276 atctctttaaaggccatgtctccagagtcatgtgttgaagttctgggggttagtgggacacagttcagcccctaaaagagtctct
1361 ctgcccctcaaatttccccacctccagccatgtctccccaagatccaaatgttgctacatgtgggggggctcatctgggtccct
1446 ctttgggttcagtgtgagtctggggagagcattccccagggtgcagagttgggggagtatctcagggctgcccaggccggggtg
1531 ggacagagagcccactgtggggctgggggcccctcccaccccagagtgcaactcaaggtccctctccagGTGGCGGGGACTTG
1616 GCACTCCTTGGCTATGGCGGCCAGCGACATCTCCCTGCTGGATGCCCAGAGTGCCCCCCTGAGAGTGTACGTGGAGGAGCTGAAG
1701 CCCACCCCCGAGGGCAACCTGGAGATCCTGCTGCAGAAATGgtgggcgtctctccccaacatggaaccccccactccccagggctg
1786 tggaccccccgggggtgggtgcaggagggaccagggccccagggctggggaagagggctcagagtttactggtacccggcgct
1871 ccacccaaggctgcccacccagggctttttttttttttaaacttttattaatttgatgcttcagaacatcatcaaacaaatgaac
1956 ataaaacattcatttttgtttacttggaaggggagatataaatcctctgaagtggaaatgcatagcaaagatacatacaatgaggc
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2126 cctcagtatctaaaatgaacaagaagtcctggaaacgaagcagtgtggggataggcccgtgtgaaggctgctgggaggcagcaga
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2296 tgtgggggcagagatggggacctgaaccccagggctgccttttgggggtgcctgtggtcaaggctctccctgacctttctctct
2381 ggcttcatctgacttctcctggcccatccacccggtcccctgtggcctgaggtgacagtgagtgcgccgaggctagttggccagc
2466 tggctcctatgcccatgccacccccctccagccctcctgggccagcttctgcccctggccctcagttcatcctgatgaaaatggt
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2636 TCCCTGCGGTGTTCAAGATCGATGgtgagtccgggtccctgggggacacccaccacccccgccccgggactgtggacaggttc
2721 agggggctggcgtcgggccctgggatgctaagggactggtggtgatgaagacactgccttgacacctgcttcacttgcctcccct
2806 gccacctgcccgggtccttggggcggtggccatgggcaggtcccggctggcgggctaacccaccagggtgacacccgagctctct
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2976 cccactccaggggcccaggtgccccacgaccccagcccgctccacagctccttcatctcctggagacaaactctgtccgccctcg
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3146 agcctgggccacatctgcccttggcccccgcaggactcactctgactggaggccctgcactgactgacgccagggtgcccagccc
3231 agggtctctggcgccatccagctgcactgggtttgggtgctggtcctgcccccaagctgcccggacaccacaggcagccgggggct
3316 gcccactggcctcggtcagggtgagccccagctgcccccgctcagggcttgccccgacaatgaccccatcctcaggacgcacccc
3401 ccttcccttgctgggcagtgtccagccccacccgagatcgggggaagccctatttcttgacaactccagtccctgggggagggggg
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3656 ttcgccgggtggtgaccccgggggagccccgctggtcgtggagggtgctgggggctgactagcaacccctccccccccgttggaa
3741 ctcactttctcccgtcttgaccgcgtccagCCTTGAATGAGAACAAAGTCCTTGTGCTGGACACCGACTACAAAAAGTACCTGC
3826 TCTTCTGCATGGAAAACAGTGCTGAGCCCGAGCAAAGCCTGGCCTGCCAGTGCCTGGgtgggtgccaaccctggctgcccaggga
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3996 tcccgccaggagagagtggtcgcataccgggagccagtctgctgtgggcctgtgggtggctggggacgggggccagacacacagg
4081 ccgggagacgggtgggctgcagaactgtgactggtgtgaccgtcgcgatggggccggtggtcactgaatctaacagcctttgtta
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4166 ccggggagtttcaattatttcccaaaataagaactcaggtacaaagccatctttcaactatcacatcctgaaaacaaatggcagg
4251 tgacatttttctgtgccgtagcagtcccactgggcattttcagggcccctgtgccaggggggcgcgggcatcggcgagtggaggct
4336 cctggctgtgtcagccggcccaggggggaggaagggacccggacagccagaggtgggggggcaggctttccccctgtgacctgcaga
4421 cccactgcactgccctgggaggaagggaggggaactaggccaaggggggaagggcaggtgctctggagggcaagggcagacctgca
4506 gaccaccctggggagcagggactgacccccgtccctgccccatagTCAGGACCCCGGAGGTGGACAACGAGGCCCTGGAGAAATT
4591 CGACAAAGCCCTCAAGGCCCTGCCCATGCACATCCGGCTTGCCTTCAACCCGACCCAGCTGGAGGgtgagcacccaggccccgcc
4676 cttccccagggcaggagccacccggccccgggacgacctcctcccatggtgaccccagctccccaggcctcccaggaggaaggg
4761 gtggggtgcagcaccccgtgggggccccctccccaccccctgccaggcctctcttcccgaggtgtccagtcccatcctgaccccc
4846 ccatgactctccctccccccacagGGCAGTGCCACGTCTAGGTGAGCCCCTGCCGGTGCCTCTGGGgtaagctgcctgccctgccc
4931 cacgtcctgggcacacacatggggtaggggtcttggtggggcctgggaccccacatcaggccctggggtccccctgtgagaat
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5271 atgtccatttcagGGCCCGGGAGCCTTGGACTCCTCTGGGGACAGACGACGTCACCACCGCCCCCCCCCCATCAGGGGGACTAGA
5356 AGGGACCAGGACTGCAGTCACCCTTCCTGGGACCCAGGCCCCTCCAGGCCCCTCCTGGGGCTCCTGCTCTGGGCAGCTTCTCCTT
5441 CACCAATAAAGGCATAAACCTGTgctctcccttctgagtctttgctggacgacgggcaggggggtggagaagtggtggggagggag
5526 tctggctcagaggatgacagcggggctgggatccagggcgtctgcatcacagtcttgtgacaactgggggcccacacacatcact
5611 gcggctctttgaaactttcaggaaccagggagggactcggcagagacatctgccagttcacttggagtgttcagtcaacacccaa
5696 actcgacaaaggacagaaagtggaaaatggctgtctcttagtctaataaatattgatatgaaactcaagttgctcatggatcaat
5781 atgcctttatgatccagccagccactactgtcgtatcaactcatgtacccaaacgcactgatctgtctggctaatgatgagagat
5866 tcccagtagagagctggcaagaggtcacagtgagaactgtctgcacacacagcagagtccaccagtcatcctaaggagatcagtc
5951 ctggtgttcattggaggactgatgttgaagctgaaactccaatgctttggccacctgatgtgaagagctgactcatttgaaaaga
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6121 catgggtttgggtggactccaggagttggtgatggacagggaggcctggcgtgctacggaagcggtttatggggtcacaaagact
6206 gagtgactgaactgagctgaactgaatggaaatgaggtatacagcaaagtggggatttttagataataagaatatacacataac
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6461 cagggattgaaccggcatctcctgtattggcaggtggattctttaccactgtgccaccagggaagcccgtgttactctctatgtc
6546 ccacttaattaccaaagctgctccaagaaaaagcccctgtgccctctgagcttcccggcctgcagagggtggtgggggtagactg
6631 tgacctgggaacaccctcccgcttcaggactcccgggccacgtgacccacagtcctgcagacagccgggtagctctgctcttcaa
6716 ggctcattatctttaaaaaaaactgaggtctattttgtgacttcgctgccgtaacttctgaacatccagtgcgatggacaggacc
6801 tcctccccaggcctcaggggcttcagggagccagccttcacctatgagtcaccagacactcgggggtggccccgccttcagggtg
6886 ctcacagtcttcccatcgtcctgatcaaagagcaagaccaatgacttcttaggagcaagcagacacccacaggacactgaggttc
6971 accagagctgagctgtccttttgaacctaaagacacacagctctcgaaggttttctctttaatctggatttaaggcctacttgcc
7056 cctcaagagggaagacagtcctgcatgtccccaggacagccactcggtggcatccgaggccacttagtattatctgaccgcaccc
7141 tggaattaatcggtccaaactggacaaaaaccttggtgggaagtttcatcccagaggcctcaaccatcctgctttgaccaccctg
7226 catctttttttctttttatgtgtatgcatgtatatatatatatatatttttttttttttcatttttggctgtgctggctgttcgt
7311 tgcagttcggtgcgcaggcttctctctagtttctctctagtcttctcttatcacagagcagtctctaga 7379

Fig 1. The 7379bp of genomic sequence encompassing the ovine BLG gene. Upper case sequence corresponds to the transcribed exons that comprise the mature message (3,6). Underlined at 5938-6231 and 6328-6444 are sequences with homology to previously described artiodactyl Alu-like repeat sequences (7,8 respectively).

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